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SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE •



OCTOBER 12, 1935

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The Weekly

Summary of

Current Science

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SCIENCE SERVICE

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DO YOU KNOW?

'Possums tend toward cannibalism in captivity.

A tennis net of stainless steel is said to have advantages over the usual net of cord.

The principal magnetic poles of the earth are 1,200 miles or more away from the geographic poles.

A mysterious disease of sugar beets, discovered in Michigan in 1932, is now attributed to a lack of boron in the soil.

A new kind of glass, especially adapted for use in helmets worn by welders, is so treated that hot metal will not stick to it.

The Field Museum has a boulder of Lake Superior copper which was found in Indiana, having been carried there over 400 miles by a glacier.

Tung oil, imported mainly from China, has advanced in price so rapidly in recent months that paint and varnish makers are seeking substitutes.

A temple to Jupiter has been discovered by workmen repairing a road on the Aventine Hill at Rome.

British scientists, seeking the best kinds of peas for canning, have tested over 100 varieties in the past ten years.

Most rivers of northeastern United States run so swiftly and have so short a course that flood warnings would be of little practical use.

The 47,600 post offices in the United States are to aid in migratory-bird conservation by displaying the game-law poster on bulletin boards this year.

Experimenters at Dartmouth College have produced devices promising aid to persons suffering from aniseikonia—an eye defect in which an object appears a different size in each eye.

India needs many more doctors to care for its teeming millions of people, says the dean of the Medical College, University of Bombay, recent visitor to this country.

WITH THE SCIENCES THIS WEEK

Most articles are based on communications to Science Service or papers before meetings, but where published sources are used they are referred to in the article.

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How can plants do setting-up exercises? p. 231.

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PSYCHIATRY

Has the depression driven Americans insane? p. 230.

PUBLIC HEALTH

To what diseases will soldiers invading Ethiopia be exposed? p. 228.

BIOLOGY

Half-Cells Without Nuclei Develop to Many-Celled Stage

Pieces of Sea-Urchin Eggs, Lacking Both Maternal and Paternal Nuclei, Divide and Arrange Selves Into Spheres

ANIMAL life without either father or mother, a discovery that may change fundamental biological concepts, has been shown to be possible by Dr. Ethel Browne Harvey, in experiments at the Marine Biological Laboratory at Woods Hole. Younger development-stages of one genus of sea-urchin have been produced from halves of eggs, from which the maternal nucleus had been excluded and which were never fertilized. (*Science*, Sept. 20)

This is the first known case in which cells have divided, and even the first stages of body-development occurred, without at least the mother-nucleus being present. That the father-nucleus can be dispensed with was demonstrated many years ago by the noted biologist Dr. Jacques Loeb; and that was more than a nine-days-wonder when it was announced.

Dr. Harvey's experiments began with unfertilized eggs of the common sea-urchin called by zoologists *Arbacia*. These she whirled in a centrifuge, developing a force of 10,000 times gravity, until they came in two. The half-eggs containing nuclei she discarded, keeping only the enucleated halves.

Dr. Harvey treated these with concentrated sea water—a pinch of common table salt to a tablespoonful of sea water. Sea water thus concentrated, and a number of other chemicals as well, are known to be able to start parthenogenetic or "fatherless" development. When transferred back to normal sea water, they began to undergo the changes leading up to ordinary cell division, and some of them actually did divide.

The division continued, until in many cases there were aggregates of as many as a hundred unnnucleated cells, forming the hollow spheres characteristic of this stage of embryonic development. An initial bit of unnnucleated maternal protoplasm one eight-hundredth of an inch in diameter had developed into a many-celled organism, the blastula stage of the sea urchin. Stages more advanced than this have not yet been obtained.

Did Have Mother

Strictly speaking, of course, these young animals with no nuclei in their cells did have a mother, for the cytoplasm, or non-nuclear protoplasm, was formed by the mother sea-urchin. However, since it has always been the accepted assumption that

the "essence" of parenthood is in the nucleus, they have certainly been launched into life without the normal dowry given to all known cells of natural occurrence.

It has been a further accepted basic assumption in biology that the cell-protoplasm's activities are in some way "controlled" or "guided" by the nucleus. To find unnnucleated half-cells thus able to manage their own affairs, and even to take the first steps in the complex process of building an organism, may necessitate some revolutionary changes in biology's fundamental concepts.

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ARCHAEOLOGY

Mysterious Hand-Written Bible Interests Scholars

DID a devout monk in Egypt, about three hundred years after Christ, have his hand-written Bible buried with him, for Arab treasure hunters to dig up and sell to eager scholars today?

This may be the story back of the mysterious Bible of extreme age and very great importance, that has been coming to light, bit by bit, since 1930.

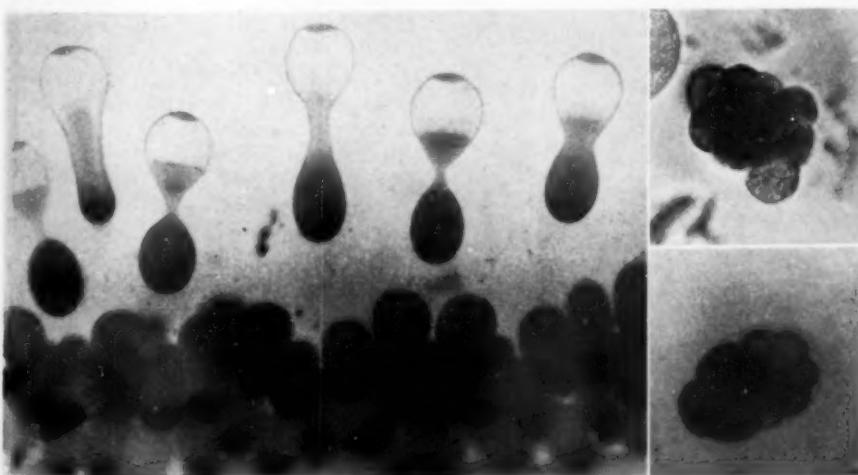
Arab dealers who sold 190 papyrus leaves of this book to A. Chester Beatty, Englishman, five years ago, had nothing to say about the source of the find. Since then, the University of Michigan has acquired more than 30 leaves, in installments, with equal mystery surrounding their past. And now, 46 more leaves have come to Mr. Chester Beatty.

The Bible pages in Greek thus revealed are giving scholars new ideas about the earliest Bible wording—which they are continually seeking—and the order of the books, and most particularly they find their wonderful new treasure a principal authority for the Epistles of St. Paul.

Reports are beginning to appear, giving expert views as to the significance of the "Chester Beatty Biblical Papyri," as the book divided between England and America is called.

A large part of the Epistles of Paul, included in the University of Michigan possessions, have been studied by Prof. H. A. Sanders. The letters of St. Paul are not arranged as in modern Bibles, he reports. The book of Hebrews follows Romans in this Bible used in Egypt long ago. Placing the book of Ephesians before Galatians, instead of after it, is another change in order.

Not knowing the place and circumstances of the discovery of this Bible is a great handicap to scholars who are trying to estimate its age and importance. Different parts of the whole manuscript



MANY-CELLED LIFE WITHOUT NUCLEI

Under a centrifugal pull equivalent to 10,000 times gravity, sea-urchin eggs break in two, the nucleus always remaining in the lighter half. The unnnucleated half, subjected to proper chemical conditions, divides and develops like a normal egg cell, although at a much slower rate. At right: upper picture shows many-celled aggregate resulting from repeated division of one of these half-eggs without a nucleus; lower picture shows corresponding stage reached in about one-fourth the time by a normal, fertilized egg.

have been said to belong to the second, third, or fourth centuries, from the writing and other small clues that catch an expert's eye.

Current gossip in Egypt says that the papyri were found in a Coptic graveyard, says Prof. Sanders. If true, this would suggest that the graveyard was used by a Coptic monastery. The leaves may have come from a single grave, buried perhaps with the last member who could read Greek. Prof. Sanders doubts that the finders of the manuscript could have opened a series of graves in a Coptic monastery without detection. It seems more likely that the papyri were found in one

grave, and the time when the book was buried is placed in the fourth century—since some parts seem as young as this.

A handwritten Bible of papyrus is not apt to have lasted in use more than a century, Prof. Sanders estimates. So, he figures that the very oldest portions, which happen to be the Numbers and Deuteronomy books, were written out at the end of the second century or in the early part of the third. This would be around 200 A.D. Handwritten as it was, a Bible in those days was assembled book by book, and the result was not the work of a single scribe or a single year.

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PUBLIC HEALTH

Smallpox, Typhus, Relapsing Fevers Epidemic in Ethiopia

DEATH and disease are No. 1 enemies along the lengthening Italian-Ethiopian battle lines. Reports on disease conditions in Addis Ababa as communicated in consular reports to the U. S. Public Health Service read like the index to a medical book.

Epidemics of typhus fever, relapsing fever and smallpox are harassing the Ethiopian capital and surrounding country, according to the latest report. The number of cases or even of deaths in these three epidemics is unknown, as no statistics on sickness, deaths or births are collected. Vaccination against smallpox is not practiced.

Leprosy is very common in Ethiopia. So are venereal diseases, and syphilis is

reported to be more prevalent there than in any other country. It is said that 90 per cent. of the adult population is affected by some venereal disease. Malaria of course is always present. Tuberculosis, grippe, pneumonia, quinsy, asthma and dysentery are other diseases reported prevalent. Practically all the adults in the country have tape-worms.

Cholera and plague are not mentioned in the consular reports, and Ethiopia is out of the yellow fever and sleeping sickness regions. But as one health official put it, if these four diseases are not present in the country, they are about the only ones the Ethiopians do not have.

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CHEMISTRY

Frozen Bread Stays Fresh For Week; Flavor Stays Good

FROZEN bread is the newest idea in the baking industry, and the most promising.

Public demand for fresh bread has kept bakers continuously working on a hand-to-mouth schedule. Now, they are trying something that may keep their product a week.

To hunt for some good way of delaying staleness of bread, the American Association of Cereal Chemists tried effects of both heat and cold.

Stored hot, that is, up toward 150 de-

grees Fahrenheit, bread would become stale more slowly, but flavor and color were "discouraging."

At moderate temperatures, say 50 to 90 degrees, nothing surprising could be expected. Every one knows how bread grows stale in ordinary circumstances.

But effects of freezing surprised the experimenters. The bread became partially stale, according to technical tests of penetration. Yet the aroma and flavor were pronounced as good as, or even better than, in freshly baked bread. At a

recent meeting of New York cereal chemists, the assembled chemists were fed bread that had been kept a week below freezing and also bread baked the previous day and handled in ordinary fashion. The majority voted for the week-old product, for aroma and flavor.

If the tests, now being continued, prove satisfactory, the baking industry seems likely to win a considerable advantage. Shipment of bakery goods to more remote points and better adjustment of supply and demand, with less waste, are possible benefits.

Holland has already tried out this idea of freezing bread to solve a local problem. Bakers in the Netherlands are not permitted to work between eight at night and five in the morning, and fresh bread may not be transported before nine A. M. Bakers reported unhappily that business suffered because people could not get fresh bread for breakfast and for preparing lunches for school children and workers.

To meet this situation, a Rotterdam baking concern, operating chain stores, recently resorted to use of "dry ice" to keep bread, claiming that bread thus preserved for several days cannot be distinguished from bread fresh from the oven.

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PLANT PHYSIOLOGY

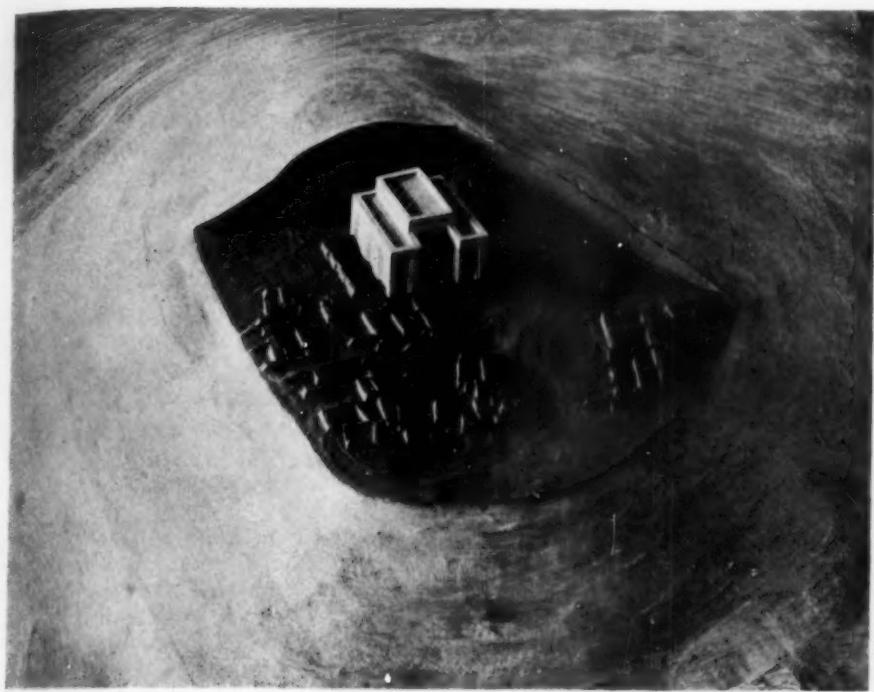
Neon Lamps Are Replacing Incandescents in Forcing

NEON lamps, running on the same principle as the red-glowing American street signs, have proved far more satisfactory than the conventional incandescent lamps for use in forcing plants and flowers in the experimental greenhouses of the Agricultural College of Wageningen, The Netherlands. They are more economical, partly because they convert a far greater proportion of the electric current into light and waste less as heat, and partly also because their light is rich in the yellow and red wavelengths that are most stimulating to the action of chlorophyll in the green leaves.

Among the plants so far tested have been cucumbers, strawberries, begonias and a number of other flowers. In some of the experiments an extra supply of carbon dioxide gas was artificially administered.

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Poor handwriting goes with poor spelling, according to Dr. Alice E. Watson of Teachers College, who has surveyed spelling of thousands of high school students.



AFTER 5,600 YEARS

A model showing how City Ten—counting from top—looked at Tepe Gawra when archaeologists dug down to it below nine other flattened and wrecked cities. Walls of this layer were found standing more than three feet high. The temple is shown as it would look restored. The model, scaled to 100th actual size, is by Charles Bache and E. B. Miller, the architect of the Tepe Gawra expedition.

ARCHAEOLOGY

American Scientist Sails to Dig at "World's Oldest City"

DESPITE war clouds hanging low over the Mediterranean and Ethiopia, Charles Bache, of the University Museum, Philadelphia, has sailed for Iraq to resume his peaceful and scholarly task of digging to the depths of "the oldest city in the world."

Like the Italians who waited for the end of Ethiopia's rainy season, Mr. Bache has been eagerly waiting for the wet season to end in the valley of the Tigris and Euphrates. With the receding of the summer flood waters, he expects to start exploring remains of a civilization as old as 4000 B.C.

Tepe Gawra, as the site is called, is a mound containing 20 to 22 layers, each of which represents, packed down, all that is left of a stage of ancient civilization. Dr. E. A. Speiser of the University Museum staff first investigated the mound in 1927, and dug the trial trench which revealed the succession of 20 or more cities on the ground.

Working with the American School of Oriental Research, the Museum has "peeled off" twelve layers, the twelfth one going back to about 4000 B.C., when the people had no knowledge of using metal. People whose city lay just over this one imported metals, the digging shows, but did not know how to work them. Copper to them was hard stone-like stuff, and used as such. Mr. Bache called them Chalcolithic or copper-stone people.

The twelfth city from the top, where the digging will be resumed, reveals a people still in the stone age, dubbed the Painted Pottery People, for want of a better name.

Important as have been the discoveries at Tepe Gawra thus far, they are pronounced merely preliminary to the work Mr. Bache now sails to take up. Eight years of digging brings the expedition to a period of early civilization very little known.

One of the late discoveries before Mr. Bache was forced to stop work last season was a slender vase found by an impetuous workman who sank his pick below City Twelve, and dug right through to the earlier unexplored City Thirteen. The vase had contained kohl, used by women to darken their eyelids, in the make-up fashions of more than 6,000 years ago.

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CHRONOLOGY

The Ethiopian Calendar Has Thirteen Months

OF ALL the countries in the world, Ethiopia is only one which uses a calendar of thirteen months. The Ethiopian year commences on September 11 except in years preceding leap year, when it begins on September 12, as was the case in 1935. The year is divided not as ours, but into twelve months of thirty days each and one of five days, or in leap years six days. Consequently the subjects of the King of Kings are always out of step, as far as the calendar is concerned, with the rest of the world.

This type of calendar, however, is of extremely ancient origin. Long before any other nation had devised an accurate calendar, the Egyptians had contrived one which took account of the true length of the year, basing it upon the sun instead of the moon, as all other peoples had done. Twelve months, each of thirty days, were set up, and the additional five days were distributed as extra holidays in convenient places throughout the year. As a result of this accurate and dependable calendar by which the priests could definitely foretell the seasons, Egypt grew to be the richest nation in the ancient world. The survival of this type of calendar in Ethiopia was brought about by the adoption of the Egyptian or Coptic variety of Christianity more than 1,500 years ago.

The Ethiopian calendar, though it consists of thirteen months, should not be confused with the Thirteen Equal Months Calendar. This latter proposal suggests that the year be re-arranged so that there will be thirteen months, all equal in length to contain exactly four complete weeks, with every year starting on Sunday, January 1. That it is practical is shown by the fact that it is already being used to advantage by more than one thousand business firms.

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Tobacco pipes six feet long are smoked in ceremonials by certain African tribes.

ASTRONOMY

Hundreds of New Variables Found by Woman Star-Gazer

Most of These Are So Faint That They Can Be Photographed Only With the Largest Telescopes

MORE than 200 previously unknown variable stars whose light usually fluctuates in intensity each day, something like celestial airway beacons, were reported to the meeting of the American Astronomical Association by Dr. Helen Sawyer Hogg of Dominion Observatory, Victoria, B. C., one of Canada's few women astronomers.

The new variable stars were discovered during a careful study of more than 500 photographs of star clusters recently secured in the first research program using direct photography with two of the world's largest telescopes, the Dominion Observatory instrument and the Dunlap Observatory telescope just put into use near Toronto.

Dr. Hogg secured the plates made at Dominion Observatory at the Newtonian focus of the instrument while perched in a cage-like basket suspended many feet above the great 72-inch mirror.

The globular star clusters, of which about one hundred are known, are being systematically searched to discover new variable stars, Dr. Hogg stated. More

than 1,000 variable stars are already known. They are distributed very unevenly among the clusters. Nine clusters appear to be devoid of the variable star types. In others the number of variables may range from two or three to a cluster to several hundred.

Most of the variable stars are so faint that they can be photographed only with the largest telescopes having great light-gathering power.

"The light of the variable stars fluctuates in regular periods," Dr. Hogg explained, "and most of them are of the so-called cluster type cepheids whose period between two phases of maximum brilliancy is less than one day."

"Occasionally we may find a long-period star whose variations require up to thirty-three days. In globular clusters, the only objects in the heavens where we find together cepheid type variable stars of both short and long periods, we have a valuable key which aids us in checking the period-luminosity law; a valuable tool of the astronomer in his endeavors to see just how the universe works."

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ASTRONOMY

Sunspot Activity Increases; Giant Streamer is Observed

THE GREATEST outburst of sunspot activity since last summer is sweeping the sun, according to photographs obtained at the Naval Observatory.

Above the sun's equator, on what would be the northern hemisphere of the earth, a giant streamer extends from 47 to 82 degrees of longitude, or over one-sixth of the sun's diameter. The length of the streamer is approximately 144,000 miles.

Also in the northern latitude of the sun is a sunspot group moving, as is customary, from east to west.

In the southern latitudes of the sun's surface are five separate groups of sun-

spots, some of them containing as many as three spots.

The giant streamer was first observed at the start of the week of September 22, while the activity in the sun's southern latitudes started on Sept. 26.

Coupled with the increased sunspot activity has been a succession of moderately severe magnetic storms, according to reports from the U. S. Coast and Geodetic magnetic station at Cheltenham, Md.

"These storms," reports W. M. McFarland, "seems to be a recurrence of the magnetic activity of late August and late July. There is often an interval of

about 27 days between these recurrences, and sometimes such a group of magnetic disturbances will continue to occur for several years with this 27 day interval between the appearances. The present group of disturbances seems to have appeared first about two months ago.

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PSYCHIATRY

Increase in Mental Ills Is Not Due to Depression

THE NUMBER of new cases of mental disease admitted to the hospitals in New York State has increased from 6,300 in 1912 to about 12,000 in 1934, a 27 per cent. increase in the rate per 100,000 of population.

The increase in mental disease is not due to the mental strain and stress of the depression, however, Dr. Carney Landis, of the New York Psychiatric Institute and Hospital, said in an address over the Columbia Broadcasting System.

Only one type of mental disease has increased materially in this period; a disease which affects only persons past middle age and is due to the hardening of the blood vessels in the brain. The rate for patients sent to mental hospitals on account of this disease has skyrocketed from less than 2 per 100,000 in 1912 to over 14 per 100,000 in 1934, a jump of almost 700 per cent. in 22 years.

Why are more people suffering from hardening of the arteries in the brain? We cannot blame that on the depression, Dr. Landis said. It is explained by the simple fact that the United States now has many more people old enough to be subject to this disease than were living in 1912. In 1912 about one fifth of the population was 45 years old or older. In 1934 practically one quarter of the population was in this age group.

We have more old people now because public health work and preventive medicine have added more than 10 years to the life span of the average American since 1900, Dr. Landis indicated.

"After all, a man must die of something, and if typhoid does not take him at 30, hardening of the arteries in the brain may at 60," he said.

"Depression, financial insecurity, unemployment, and general unrest have not led to any increase in hospitalized insanity," Dr. Landis concluded.

"This does not mean that there has not been plenty of mental stress and anguish, plenty of ragged nerves and unhappiness, but these psychological stresses and tensions have not led to an increased rate of hospitalized mental disease."

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PLANT PHYSIOLOGY

Setting-up Exercise Makes Sensitive Plant "Stronger"

SETTING-up exercises—a routine of weight-lifting—make the leaf-stem of a sensitive-plant "stronger," Drs. W. E. Burge and G. C. Wickwire have found in experiments performed in the physiological laboratory of the University of Illinois. (*Science*, Sept. 27)

The two physiologists selected a healthy specimen of the common sensitive-plant Mimosa, which responds to stimuli by folding up its leaves, at the same time folding down its leaf-stems. They attached a tiny weight to one of the leaves, leaving another leaf of similar size unweighted, as a "control."

Then they stimulated both leaves. When the weighted leaf returned to its normal position, of course it had to carry the added weight up with it. Again and again the two leaves were stimulated, so that the loaded one had to go through a course of weight-lifting exercises.

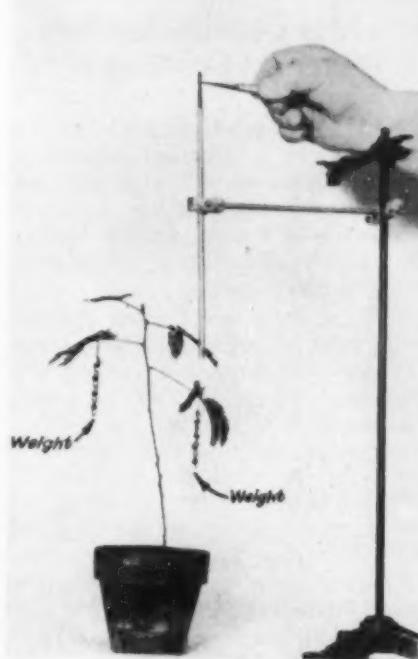
Every day for five days the weights

were increased a little, and the setting-up exercises were repeated. Then the weights were gradually decreased, but the exercises still kept up.

Finally, after a month of this "training," similar weights were attached to both the weight-lifting leaf and the unweighted control leaf, and their respective lifting abilities compared. It was found that the exercised leaves performed 41 per cent. more work than the unexercised ones. Moreover, when repeated effort was demanded, the unexercised leaves became "tired" more easily.

"From the preceding experiments," Drs. Burge and Wickwire conclude, "it may be concluded that the performance of physical work increases the capacity of the leaves of the plant, Mimosa, to do work and renders them more difficult to fatigue, an effect very similar to the action of physical work on the muscles of animals."

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"READY—EXERCISE!"

The Mimosa leaf was stimulated to its weight-lifting stunt by dropping a tiny cylinder of wood on it, through a glass tube, to insure correctness of aim and a uniform stimulus every time.

ANTHROPOLOGY

Age of Oldest Americans Is Still an Unsolved Mystery

SOLVING the mystery of America's first inhabitants promises to be one of the longest, most persistent detective hunts on record.

Hundreds of years from now, scientists in this country will still be working on facts, clues, and rumored discoveries that add up to form the picture of the first people who roamed the vast continent.

This is the long look ahead taken by archaeologist Charles Amsden of the Southwest Museum, Los Angeles, who considers discoveries of Ice Age Americans so far announced as merely a promising beginning of possible revelations.

Drawing a comparison with scientific efforts to reveal the dawn men of the Old World, he points out that most of the knowledge of early man in Europe comes from France. And France is a smaller area to explore than the single state of Texas.

"Centuries must pass," he predicted in a Science Service address over the Colum-

bia Broadcasting System, "before we'll know America as thoroughly as we know France. And what we learn may change the picture completely."

Here is one discovery, cited by Mr. Amsden, and showing how a revelation of America's early people comes in some new quarter:

"Recently, in the southern California desert, archaeologists have found hundreds of camping places, with thousands of stone implements, most of which bear a strong resemblance to the European types of the last Old Stone Age, say 15,000 years ago. These camps line the banks of three streams that no longer exist, their dry channels choked with drift sand. Native American camels and horses lived along these streams. We find their fossil bones strewn around the camps in thousands of fragments. When was the bleak California desert such a well-watered spot? Apparently not since the glaciers melted, the geologist answers,

and by their melting created a humid climate."

Emphasizing that much of what is said regarding early Americans is conjecture, Mr. Amsden sums up certain facts "as plain as the nose on your face":

"Man was in America when most of the big game animals were of the Ice Age group, not the modern group we know today. He was here when the climate was far cooler and more humid than it is today. He made weapons that resemble most closely the types of the late Old Stone Age and the early New Stone Age in Europe. He apparently avoided the glaciated area of North America, for his remains are never found within it."

The most conservative conclusion to be drawn from these facts, Mr. Amsden finds, is that man was already in America while the land lay under the spell of the last great surge of the ice wave. The minimum extent of American prehistory is thus, by the evidence, traced to the twilight of the Ice Age, the archaeologist reasons.

But he adds: "Don't let anybody tell you we've necessarily reached as far back as the maximum."

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Ancient Chinese tried having tame deer draw their carriages.

CHEMISTRY

Fish May Detect Fluorine In Water for Drinking

SMALL fish may in future be used to detect the presence of fluorine in drinking water instead of the tedious chemical tests now necessary, it appears from a report by Dr. Andrew Neff of the California Institute of Technology. (*Science*, Sept. 27)

Small amounts of fluorine in drinking water cause a condition known as mottled enamel in the teeth of children who drink such water. Dr. Neff now finds that the teeth of fish living in fluorine-containing water also are affected. If the degree to which the fish teeth are affected can be accurately correlated with the amount of fluorine in the water, the fish test may replace the lengthy chemical analyses now used to detect the very small amounts of fluorine which cause the condition.

In reporting his studies thus far, Dr. Neff states that he will appreciate receiving small fish, preserved in 10 per cent. formalin, from regions where mottled enamel is endemic.

Science News Letter, October 12, 1935

ANIMAL HUSBANDRY

Electric Brooder Keeps Little Pigs Warm Enough

LITTLE pigs can be kept warm by an electric brooder, a privilege hitherto monopolized by the incubator infants of the poultry yard. The device was invented by A. W. Oliver, C. J. Hurd and F. E. Price of the Oregon Experiment Station. They developed it as a means of preventing losses in brood pigs, caused by the expensively frequent awkwardness or carelessness of porcine mothers, which often lie down on their offspring and crush or smother them without ever knowing they are there.

The brooder is a simple device. About twenty-two feet of copper-sheathed heating cable was enclosed in a two-foot pan of metal and wood. This pan is connected by heavily insulated wire to an ordinary 120-volt lighting current.

The initial cost of the brooder is very low. A manufacturing firm is now contracting to make one that sells for less than \$6, and it can be operated continuously for ten days, at average farm current rates, for 72 cents.

Success in the tests is shown in records of a larger percentage of pigs raised to weaning age, as well as considerable reduction of the farmer's labor at farrowing. Once trained to go to the brood-

er when through nursing (and this proves an easy matter), no further attention need be given the pigs, as they readily accept the attractive warmth furnished them away from their mother's careless rollings and tramplings. She ceases to be anything more than a meal ticket to them.

By placing the brooder, slightly raised from the floor to prevent too much dampness, in a corner of the farrowing pen and covering it with straw, it becomes a snug nest for the pigs. To conserve the warmth, a wooden frame was built over which burlap may be thrown as a covering.

Science News Letter, October 12, 1935

CLIMATOLOGY

You, Your Boy and Dog Live in Varying Climates

YOU, your small boy and your dog live in different climates as you walk down a hot city street together—especially if your dog is a dachshund. The closer to the pavement you are, the more uncomfortable the world is.

This fact, recognized in a general sort of way for a long time, has been reduced to a measured basis by temperature readings taken by Vienna weathermen during the recent warm weather. Their observations would be closely paralleled by similar readings taken in any large city.

With air temperatures in the nineties and upper eighties, pavement temperatures mounted well above the century mark. In a courtyard that was partly paved, partly sodded, the temperature at ground level on the grass was 103 degrees Fahrenheit. The corresponding temperature on a granite block pavement under full sunshine was 124 degrees, while a dark wood-block pavement fairly simmered at 153 degrees. A few yards away was a shaded alley; into this the observer carried his tortured thermometer and set it on the stone pavement. The mercury ran rapidly down again to 81 degrees.

Temperatures differed considerably in different parts of the city. On one warm noon, when the downtown temperature was 86 degrees Fahrenheit, the thermometer in a lower-lying semi-suburban quarter read 91. On the sunny side of a narrow street the temperature was 93 degrees, on its shady side only 86. The broad Ringstrasse in the middle of the city ran the thermometer up to 96, while a narrow business street nearby shot it up even higher, to 98 degrees.

Science News Letter, October 12, 1935

FORESTRY

Seeds by Carload Produced By Southern Pine Trees

PINE trees in the southern states are producing the most tremendous seed crop in years. Every five or ten years they bear a big crop of seed, but the present season's yield is huge even for a "big seed year." All four of the South's principal pine species—long-leaf, short-leaf, slash and loblolly—are thick with cones, and the winged seeds carpet the ground.

Forest interests are taking utmost advantage of the unusual harvest. C. C. C. men have gathered seed by the carload, for use in three nurseries, without visibly diminishing the supplies left on the ground. Foresters, both Federal and State, as well as progressive-minded lumber companies, are urging timberland owners to refrain from their usual practice of burning off the forest undergrowth and grass, and to exert every effort to keep accidental fires out of the woods. If the forest lands of the South can be kept fire-free for the next few years, it will be worth hundreds of millions of dollars in timberland eventually restored to normal productivity, they declare.

Science News Letter, October 12, 1935

OCEANOGRAPHY

Ship To Drift for Years In the Arctic Ice Fields

A N EXTRA-STRONG wooden ship, whose ultimate duty will be to become frozen in Arctic ice and drift with the ice fields into high latitudes, will be completed early in 1937, Prof. Wiese, Soviet explorer, has announced in Leningrad.

In general the design of the ship will follow that of the "Fram," used for similar duty by the Nansen expedition to the Arctic in 1893-96.

The chief object of the expedition which will use the new ship will be a thorough study of the deep parts of the Arctic basin which are covered the year round with an ice crust so thick that the strongest ice-breaking steamers cannot pierce it.

Science News Letter, October 12, 1935

EN FIELDS

ARCHAEOLOGY

Indians Seek Market For Famed Birch-Bark Canoes

BIRCH-BARK canoes, one of the most famous of the old Indian products, are still being turned out by Indians at Golden Lake, Ontario.

Reporting existence of this primitive American industry (*Science*, Sept. 27) Harlan I. Smith of the National Museum of Canada at Ottawa states that the Indians sell their birch-bark canoes cheaper than factory-made canoes, but markets are hard to find. To aid the Indians, and also to aid museums that may not have known such canoes are available, Mr. Smith expressed willingness to help museums or individuals get in touch with Indian canoe makers whom he considers reliable.

Science News Letter, October 12, 1935

PHYSIOLOGY

Urge Five Meals a Day Instead of Three

FIVE meals a day instead of the customary three are now advocated by two Yale University scientists, Drs. Howard W. Haggard and Leon A. Greenberg. The how and why of their five-meal day plan appear in a book, *Diet and Physical Efficiency*, published by the Yale University Press.

Studies on "human guinea pigs" in the Yale laboratories and on workers in a nearby Connecticut shoe factory have convinced the scientists that this dietary régime reduces so-called industrial fatigue and increases the amount of work that can be done.

Most people these days are glad if they can achieve the usual "three squares" a day. The five-meal plan, however, does not put any extra burden on the pocket-book. No more food is to be eaten through the day, but the usual amount is to be divided into five meals. Each of these should be smaller than the ones customarily eaten on the three-meal plan.

The new scheme requires replanning of the day's meals. The problem is one in division, not in addition. In the Yale study, the extra meals were fitted in at

the end of the third hour of work in the morning and at the same time in the afternoon. They should not consist of candy, a sweet drink or similar between-meal snacks. A glass of milk and a salad vegetable are favored by Drs. Haggard and Greenberg. In their study of the factory workers, the extra meals consisted of a glass of milk and a piece of angel food cake—this last item a concession to the workers' tastes but not entirely in accordance with the scientists' ideals.

The industrial output of factory operatives can be increased by as much as ten per cent. when their daily diet is rearranged into five meals instead of three, the Yale scientists found. The usual drop in industrial output at the end of the morning and the afternoon work periods has generally been attributed to fatigue. Those who work in offices and stores instead of factories are probably also less efficient at these times of day, though it is harder to measure their productivity. At any rate, they as well as factory workers may feel tired, irritated and disinclined to work during the last hours of the morning and afternoon. Drs. Haggard and Greenberg maintain that they are not tired but hungry, and that food, not rest, is what they need.

The three-meal day came about as a matter of practical convenience, it is pointed out. Our very adaptable bodies have become so used to the arrangement that now we do not feel hungry even when our stomachs are empty.

Science News Letter, October 12, 1935

METEOROLOGY

First Frost Comes Early, But Does Little Damage

FROST'S first coming this autumn was a few days early, the U. S. Weather Bureau's weekly survey disclosed. Killing temperatures occurred during the week ending Wednesday, Oct. 2, as far south as the northern parts of Iowa, Nebraska and Colorado. The average date for the first killing frost at this latitude is about Oct. 1; this year's first sharp freeze came three or four days earlier.

Little damage was done to crops, however, for practically all important field products are now matured safely beyond the reach of frost. Four-fifths of the Iowa corn crop has won its annual race with the cold, and similar satisfactory conditions prevail in other major agricultural states. Late vegetables were about the only sufferers in the frosted areas.

Science News Letter, October 12, 1935

CHEMISTRY

Many Odd Methods Used in "Improving" Tea

TEA HAS not always been simply steeped in hot water to make a beverage. Many and weird have been the efforts of tea-users to "improve" it. William H. Ukers, of New York, has gathered information on many of these strange practices, which he presents in a new book, "All About Tea."

One of the earliest recipes for making tea brought back to Europe is for a kind of tea-nogg, long popular in China. Père Couplet, a Jesuit missionary who went to China in 1659, describes the addition to a pint of tea of the yolks of two fresh eggs and a quantity of fine sugar. This discriminating cleric was an early advocate of moderation in tea-steeping: "The water must remain no longer upon the tea than while you can chant the Miserere psalm in leisurely fashion."

The earliest recorded Chinese method of making tea was not so moderate as this: as described by Kuo P'o about 350 A.D., it consisted in actually boiling the green leaves of the tea plant.

Improvement came soon, however, according to Lu Yu, who wrote in the year 780. Quoting from an earlier work, he directed: "To make tea as a drink, roast the teacake until reddish in color, pound it into tiny pieces, put them in a china-ware pot, pour boiling water over them and add onion, ginger and orange."

Some forms of early Chinese tea evidently were prepared in cakes or bricks, as tea is still marketed in certain parts of the world.

Tea becomes a solid food rather than a mere beverage in some Oriental regions. The Shans of northern Siam, Mr. Ukers states, steamed or boiled the leaves of the wild tea tree and molded them into balls to be eaten with salt, oil, garlic, pig fat and dried fish.

"Vestiges of the old Shan custom are detected in the making and eating of Burmese 'leptet,' or tea salad," Mr. Ukers continues. "This is a pickled tea which the Pelaungs long have had a custom of preparing by boiling and kneading jungle tea leaves, and then wrapping them in papers or stuffing them into internodes of bamboo, which they bury in underground silos for several months to ferment. Eventually the product is dug up and eaten as a great luxury at marriage feasts and similar festive occasions."

Science News Letter, October 12, 1935

ENGINEERING

Will Uncle Sam's Gas Tank Run Dry?

The United States Uses Twice as Much Petroleum As Drinking Water Each Year; How Long Will it Last?

By ANSEL E. TALBERT

PETROLEUM experts of all kinds, including geologists, chemists and statisticians, are in wide disagreement over the question of whether or not there will be a gasoline shortage in the United States within the next five or six years. Each is vehemently voicing his own opinion in the matter.

The opening guns have already been fired. At the recent national meeting of the American Chemical Society in San Francisco, Dr. Benjamin T. Brooks, consulting chemical engineer, and L. C. Snyder, geologist, both of New York, predicted that a serious shortage will arise some time between 1940 and 1943.

Going even further, these two predicted that with a little help from American motorists, the gasoline drought may come even sooner. In fact, should consumption increase, the shortage might develop within two or three years.

A petroleum shortage at any time is no laughing matter. Coming as soon as five years, it might be a national calamity. There would be no end of difficult industrial complications in an industry involving billions in the form of investments, and employing hundreds of thousands of workers.

Tripling of gasoline prices, the widespread use of low-powered "Tom Thumb" automobiles, and an added burden on the Navy and air forces of the United States to protect our import trade routes would be only a few of the probable results of a petroleum shortage.

War Would Cripple

We would be forced to import much of our crude oil from Persia, Russia, South America, and other foreign lands. This might be possible in peace times—but suppose we became involved in another war? If the enemy should succeed in cutting off our foreign trade, our entire transportation system might be crippled—practically a sentence of defeat.

"A serious dislocation of industry would result if imports were to be interrupted," the Brooks-Snyder report prophesies. "The manufacture of substitutes such as shale oil or oil made by the hydrogenation of coal could not possi-

bly be developed quickly enough to be of importance in a national emergency such as war, which would be settled one way or another long before any large part of our gasoline demand could be supplied from the auxiliary sources."

Even if we start right away, Dr. Brooks and Mr. Snyder do not believe we can do anything to stave off the predicted oil shortage. They are of the opinion that the manufacture of shale oil could not check the rise of petroleum prices until they have risen to two-and-a-half to three times the present level, and after the shortage had lasted at least several years.

Any attempts to conserve the use of present petroleum resources, they believe, will be looked upon as a political move inspired by oil companies to raise gasoline prices.

Substitutes Expensive

Alcohol and Diesel oil, two widely suggested substitutes for gasoline as motor fuel, offer little hope, as they see it. Both are too expensive to produce and distribute, with alcohol "not an economic substitute for gasoline except at price lev-

els for gasoline about five times the refinery cost of gasoline during the next five years."

All of this is only one side of the argument, of course.

Speaking before the same meeting of the American Chemical Society, Dr. J. Gustav Egloff, a Chicago petroleum expert, contradicted reports that a shortage of petroleum was imminent. According to him, there are reserves of oil of $13\frac{1}{4}$ billion barrels, equivalent to over 15 years' supply at the 1933 rate of consumption, which was close to 900,000,000 barrels for the year.

Secondary Supply

In addition, he estimated that there exists a secondary supply of oil in known fields, amounting to between 38 and 115 billion barrels of oil, not recoverable by present methods of drilling, flowing, and pumping, but available by other methods should economic conditions make its production profitable.

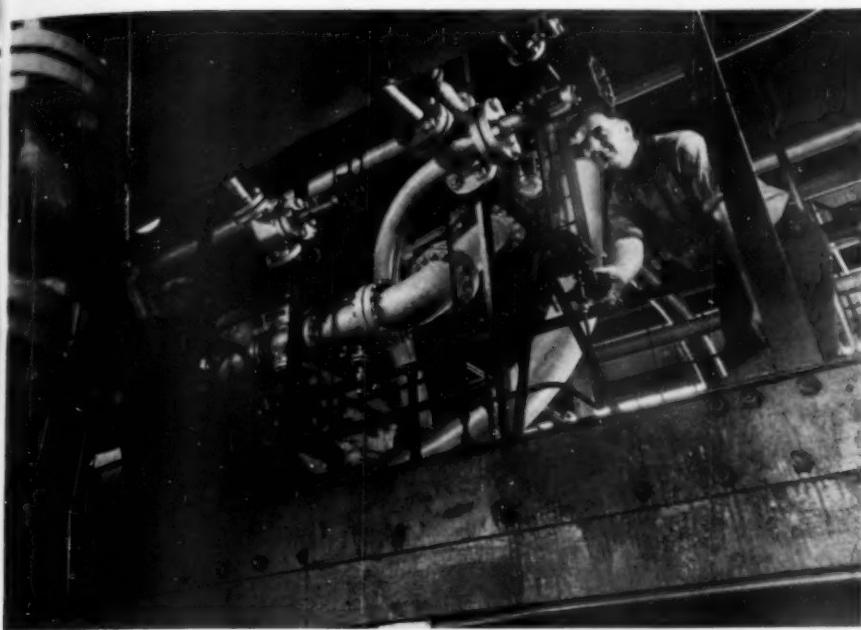
These reserves are equivalent to between 45 and 124 years' supply, he estimates.

Government economists, statisticians, and petroleum specialists of the Petroleum Administrative Board, the Geological Survey, the Bureau of Mines, and other government departments in Wash-



BENT ROCK

This deposit of oil-bearing shale in the state of Washington is so rich that the rock bends without breaking. Note the section which has come loose and bent, but not fallen, in the center of the picture.



THE SOURCE

The heart of a huge motor oil refining plant at Paulsboro, N. J. Here, more than 3000 or more barrels of lubricating oils are turned out each day to grease the motors of American automobiles.

ington, are inclined to take a position somewhere between these two extreme viewpoints.

While believing that any predictions of an imminent shortage are exaggerations, they agree that known reserves of natural petroleum are being exhausted at a rapid rate, and new discoveries are failing by a large margin to replace petroleum consumed each year.

According to the U. S. Geological Survey, the known petroleum reserves of the United States, excluding unproven areas and unknown potentials, are about 13,250,000,000 barrels. Although we use up approximately a billion barrels a year normally, this supply would last at least 14 years, if no new fields were discovered.

Rate Not Constant

It would not be possible to extract all of the petroleum reserves at that rate, however, even if we wanted to. After a few years of high oil production, oil wells have the habit of slowing down to a trickle, and continuing at this rate for a considerable length of time, so that a well might give up half of its petroleum during the first two years of production and then slow down to a dribble and take ten years or so to run dry.

Thus, if we were depending on our known oil reserves alone, a prediction of a shortage within five or six years might not be improbable, because the wells now in operation might all have slowed down

by that time. We are not standing around and waiting for this to happen, however.

New oil fields are being discovered all the time, government statisticians report, averaging an addition of 600,000,000 barrels of petroleum each year. This may not be enough to supply our demand of nearly a billion barrels without tapping our reserves, but it should make them last a great deal longer than 14 years. Figure it out for yourself.

Skeptical

As for a rise in price to three times the present cost of gasoline, and tiny, low-powered cars, in case of a shortage or attempts at conservation, government scientists are skeptical.

Prices in the gasoline field are competitive prices, and are not based on supply, demand, or anything else. The only marked rise or fall in price during recent years has been due to either the addition of taxes, or to local gasoline wars between competing companies, they say.

Even this rise and fall seems to have little effect on gasoline consumption. In fact, government statisticians, whose job it is to trace the relations between price levels and consumption, have not been able to find that rise in prices, including federal and state taxes, has any relation to consumption.

For example, in Alabama the taxes on gasoline are in the neighborhood of nine cents a gallon, and yet there has been no drop on gasoline consumption in that

state. Midget automobiles used in England and other European countries appear to be more the result of taxes on horsepower than of high gasoline prices.

Regardless of whether or not there will be a gasoline shortage within the lifetime of any automobile now on the road, the fact remains that it is high time to start looking for natural petroleum substitutes "just in case."

Our natural petroleum cannot last forever. We use twice as much petroleum each year as we do drinking water. Every day enough crude oil is taken from the ground to cover Manhattan Island—twelve miles long and averaging a mile wide—to a depth of a foot and a half.

Something Must Be Done

Barring the finding of natural petroleum in unexpectedly large quantities in the United States during the next few years, something must be done to develop new processes for utilizing the secondary oil reserves of our oil fields, untouched by present methods of recovery, and to discover cheap synthetic substitutes.

"Sooner or later a substitute for natural petroleum as the principal source of motor fuel must be found, but what it is, or when it will be commercially practical, I don't know," said a prominent official of the Department of Interior recently.

Shale oil is one possibility. Oil-bearing shale occurs in large quantities in Utah, Wyoming, and Colorado, as well as several other western states. It has been known for years that oil could be distilled from these rocks and used as fuel. They are so saturated with oil that often a huge boulder will burn like a piece of coal.

Brigham Young and his Mormon followers distilled shale oil for use in lamps, soap making, and other domestic uses more than fifty years ago. Many of the primitive stills used more than fifty years ago are still in existence and some are used even now for the same purpose.

Can't Recover It

Admitting that shale oil is a great potential source of motor fuel, government officials say that there is no technical process at present capable of recovering it in sufficient amounts and at a low enough cost to make it a substitute for natural petroleum.

Some obscure and unknown inventor or technician now at work over his test tubes may eventually discover a process capable of taking over the job of feeding American motor cars, but so far, his identity is unknown.

Alcohol is another possibility. It is

now widely used in Europe to dilute gasoline. All German gasoline must now contain about ten per cent. of alcohol by law, and varying percentages are used in Austria, Sweden, Czechoslovakia, and other neighboring nations.

Although it can be used in a pure state as well, its high cost has so far prevented this. Two recently developed German processes, the Scholler-Tornesch saccharization process and the Bergius wood hydrolysis process, are claimed to be capable of producing alcohol more cheaply and in larger quantities for use as motor fuel. Whether this is true or not remains to be seen.

Dilution

A number of proposals have been made and have received some support in Congressional circles in Washington for making dilution of all American gasoline with one or two per cent. of alcohol compulsory. This would conserve our petroleum resources and benefit the farmer, it is claimed, since alcohol can be distilled from corn, potatoes, and many other farm products.

Many chemists, however, feel that the first step in providing a real substitute for natural petroleum will be the synthetic production of gasoline from coal by a process known as hydrogenation of coal.

Several commercial processes have been developed for coal hydrogenation in Germany, which is almost entirely lacking in natural petroleum resources, and are being put to more increasing use with the help of government subsidies. Last autumn the Reich government organized a joint cooperative company known as the "Braunkohlen Benzin A.G." with money contributed pro-rata by the Central German brown coal companies, for the production of synthetic gasoline from coal on a large scale, using the Bergius process of hydrogenation.

In England as well as in America, a number of oil companies, have been experimenting with the production of synthetic gasoline, and a number of synthetic gasoline laboratories have already been built.

Price Double

So far, it has been impossible to produce it at a market price of much less than twice what an ordinary gallon of natural petroleum gasoline now costs. In other words, synthetic gasoline costs about 32 or 33 cents a gallon, although large-scale production would undoubtedly lower this figure.

What chemistry, spurred on by necessity, can accomplish can be seen by a glance at what is now happening in Germany, struggling to be free of foreign

imports. Automobiles are being driven increasingly by illuminating gas, alcohol, benzol, Diesel oil, and a variety of non-liquid gases including propane, butane, methane, coke and wood gas.

Propane and butane are available in large amounts in the United States, as well as natural illuminating gas, which is mostly methane. Both of the former are now used in liquid form as solvents to remove impurities from motor oil in U. S. refineries. Their great versatility makes it possible to use them first as a solvent and then as motor fuel, without great additional cost. These could undoubtedly be used in an emergency, although they require additional equipment to that used in gasoline burning automobiles. Liquefied propane tanks are shown on the front cover of this week's SCIENCE NEWS LETTER.

Electricity should not be overlooked as a possible source of power for automobiles. When the automobile industry was still young at the beginning of the cen-

tury, there was a great deal of competition between electric and gasoline automobiles to capture the new automobile-buying public. Although the struggle was a close one for a number of years, gasoline finally won out because of its superior speed and convenience. It took less time to say "fill 'er up" to a filling station proprietor than to wait for a battery recharge, every 75 or 100 miles.

A few electric automobiles, relics of 15 to 25 years ago, are still occasionally seen, operated by persons to whom speed is not a major consideration. The invention of a new storage battery, capable of storing much larger quantities of "juice," might enable the electric car to stage a come-back.

Scientists, on the whole, are not too greatly worried about what is going to happen after our natural resources have given out, whenever that is. Science has come to the rescue too many times in the past to fall down in this situation.

Science News Letter, October 12, 1935

PHYSIOLOGY

Reports Feeling No Sensation During a 1200-Foot Fall

AN ARMY doctor has fallen 1,200 feet in space just so he can tell how it feels. The strange result of the experiment is that there is no sensation to the fall, "except a very gentle, evenly distributed pressure something like being lowered slowly into a great bed of softest down."

The reason Capt. Harry G. Armstrong, of the U. S. Army Medical Corps, is alive to record his sensations (*Journal, American Medical Association*, Oct. 5) is that the premeditated fall was really a delayed parachute jump from an airplane. When he was 1,000 feet from the ground he pulled the ripcord and came to earth with parachute open.

During part of the fall, Dr. Armstrong kept his eyes closed. When his eyes were shut he felt no sensation whatever. It was as if he were suspended at rest in midair. When still about 1,900 feet up, he opened his eyes and sighted ground. Then for the first time he had a definite sensation of falling. This sense of fall increased rapidly and when, at 1,000 feet, the parachute was opened, "there was a fully perceptible vertical velocity."

The practical importance of the delayed parachute jump in both civil and

military aviation led to the experiment. Dr. Armstrong is director of the physiological research laboratory of the Materiel Division of the Air Corps, and is stationed at Dayton, Ohio.

The Army doctor's jump was from the rear cockpit of a two-seated biplane. It was flying on a straight and level course at 2,200 feet and at an air speed of 110 miles an hour when he jumped.

The jump was a sort of slow tumbling fall and the doctor's body somersaulted every two seconds. Careful note was made of all sensations until he pulled the ripcord. Attendants on the ground timed the free fall, and from this and a series of photographs calculated the distance of the fall. It took 11 seconds for him to fall the 1,200 feet.

As soon as he was clear of the airplane, his previous fear and excitement disappeared, the doctor states. His "consciousness was unclouded and ideation was rapid, precise, penetrating and clear." Although twelve airplanes were near, the doctor cannot recall any noise or the sound of the rush of air past the ears. He does not know whether this loss of perception in hearing was due to inattention or because atmospheric conditions.

Dr. Armstrong could see normally as he fell. There were no consciously per-



WATER FOR OIL FIRES

The time-honored rule not to use water for oil fires is successfully broken by a new fire-fighting technique. On the left is a blazing tank of oil in a recent test and at the right is the same tank a few seconds after a strong spray of water was turned on it. The water-for-oil-fires technique requires special equipment. Don't throw on water the next time your automobile catches fire.

ceptible heart beats or other bodily processes.

During the first second of fall there was a horizontal velocity of about 175 feet per second, a vertical speed of about 16 feet per second and a tumbling motion of the body. Of all these motions he was aware only of his body's rotation.

At no time did the jumper feel dizziness, nausea or the "gone" feeling in the abdomen such as is common in elevators and airplanes. His eyes, unprotected from the high wind blast, were not irritated.

His one sensation had to do with skin sensibility and was a result of the increased air pressure on the lower surface of the body, Dr. Armstrong believes. He described it as a "very gentle, evenly distributed, generalized, superficial pressure on the surface of the body toward the earth."

Such a demonstration is expected to encourage airmen to leave disabled ships more readily and to delay the opening of the parachute until all danger of entangling with the plane is past.

Science News Letter, October 12, 1935

ORADIO

Tuesday, Oct. 13, 4:30 p. m., E.S.T.

WHEN THE DUCKS FLY SOUTH, by Dr. W. B. Bell, Chief, Division of Wild Life Research, Biological Survey.

Tuesday, Oct. 22, 4:30 p. m., E.S.T.

THE LURE OF ARCHAEOLOGY, by Dr. N. C. Nelson, Curator of Prehistoric Archaeology, American Museum of Natural History.

In the Science Service series of radio addresses given by eminent scientists over the Columbia Broadcasting System.

SEISMOLOGY

Second Earthquake in Month In North Japanese Region

NORTHERN Japan was visited by a second strong earthquake shock in less than a month, a half-hour after midnight, Eastern Standard Time, on the morning of Wednesday, Oct. 2, seismologists of the U. S. Coast and Geodetic Survey stated, after studying telegraphic reports gathered by Science Service. The preceding shock in the same region occurred on the morning of Monday, Sept. 11. (*SNL, Sept. 21, p. 190*)

The exact time of the quake was 12:33 a. m., and the approximate epicenter was in about 45 degrees north latitude, 146 degrees east longitude. The focus was about 30 miles beneath the earth's surface, according to calculations made by the Jesuit Seismological Association at St. Louis, Mo.

Science News Letter, October 12, 1935

PHYSICS

Oil Fires May Be Put Out By Fine Spray of Water

WATER is being used successfully to fight oil fires, the National Fire Protection Association of Boston reports.

The water-for-oil-fire method, which apparently breaks basic rule No. 1 of fire-fighting techniques, is illustrative of progress and research in the fire-extinguishing field, says the Association.

The new revolutionary oil fire-fighting method consists of a fine spray of water forcibly ejected from special nozzles installed in sprinkler pipes or on a hose. Secret of success seems to be that the spray droplets must be of a critical size; if too large, they splash the burning oil and spread the fire; if too small, they cannot extinguish the flames. So don't rush out and throw water on the next oil fire you see.

Although not yet submitted to fire underwriters' organizations for final testing and approval, installations have already been made for the protection of electrical oil transformer and high-pressure oil systems.

Water, in a suitable spray, affects an oil fire in many ways, the NFPA points out. First, a combustible liquid will continue to burn only if its temperature is high enough to keep on creating vapor, for it is the vapor and not the liquid that does the burning.

For some types of oil fires, the spray may act by keeping the liquid sufficiently cool to prevent the needed amount of vaporization. Water suitably applied may be able to lower the temperature of the liquid below the fire point, the critical temperature for the flames.

Water, too, can affect a combustible vapor, which will not burn below what is known as its ignition temperature. The tiny droplets of water entering the flame turn to steam and in doing this absorb heat from the flame. Thus the amount of heat from the flame is reduced and vaporization of more liquid, caused by the heat, is diminished.

Water vapor can also mix in with the combustible vapor and dilute it and diminish the flame intensity.

All these happenings probably occur in varying degrees when a water spray is directed on an oil fire. Possibly also there are others more obscure.

What fire equipment companies do know is that the water drops must be shot at the fire sufficiently hard to reach the blazing surface and not be stopped by the strong upward heat convection current in the flame. And yet the drops must not hit the blazing surface so hard that they splash the oil about.

Science News Letter, October 12, 1935

MEDICINE

Play Part of Treatment At Children's Hospital

GROUP play is an important part of the nursing and treatment of the small patients at Children's Memorial Hospital, Chicago, Anne Smith, director of play at the institution, told members of the American Hospital Association.

The play is not just "something tacked on after the physical care has been attended to," Miss Smith said in describing this work at the hospital, where over four thousand patients under twelve years of age are cared for annually.

The play has become an integral part of the nursing service and has proved an effective aid in hastening the recovery of the children and preventing the beginning of neurotic tendencies so apt to start in prolonged illnesses of children.

Frightened, homesick children crying themselves into a fever are unknown at Children's Memorial Hospital, it appears from Miss Smith's description of conditions there. Nurses find that their small charges quickly stop crying and resisting the various necessary treatments and care when stories are told or guessing games played while the unfamiliar and therefore frightening procedures are being carried out.

All patients scheduled for operations are gathered in a sun room at eight in the morning and play together in groups under supervision while awaiting their turn to have their tonsils removed or other operation performed. Because play is a familiar and important part of normal child life, this makes them feel at home in the hospital and they are content and calm until the last minute before the operation.

"The whole atmosphere of a hospital is changed," Miss Smith said. "One

visiting doctor from the East seeing all the alert happy faces in our hospital claimed we had no sick children. We know that a hospital full of wan-faced irritable children is unnecessary and should cease to exist."

ANTHROPOLOGY

Thames Valley Yields Remains Of New Type Ancient Briton

FROM the Thames Valley, where he has lain buried perhaps a hundred thousand years, a new type of Stone Age Briton has come to light. Part of his skull and his weapon—a stone axe-head—have so far been unearthed.

Discovered by Alvan T. Marston, London dentist and archaeologist, the remains are arousing keen interest among scientists who have made preliminary examination of the skull fragment. The occipital bone—from the back of the head—is the part of the skull found.

The ancient Briton belonged to the Acheulian culture of the Old Stone Age, and is therefore older than any human found in Britain with the single exception of Piltdown Man—England's "Dawn Man." This is the tentative belief expressed by Sir Arthur Keith, noted British anthropologist, and his colleague Theodore McCown, American archaeologist in London.

"Important and very interesting" is their verdict. But until anatomical measurements can be completed, they say, the implications of the discovery will not be fully learned.

Agreeing in the importance of the discovery, Sir Arthur Smith Woodward, authority on ancient man, sees a resemblance in the Thames Valley man's skull to that of modern man. It is unlike that of Piltdown Man and also unlike the

The play is under the direction of nurses and volunteer play workers, all of whom are first given instruction in how to use play to the best advantage and under different conditions.

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skulls of the Neandertal race that lived some 75,000 years ago.

The gravel pit that yielded the remains, between Greenhithe and Gravesend, has been examined by Henry Dewey of the Geological Survey, to determine its geological antiquity.

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STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912

Of SCIENCE NEWS LETTER published weekly at Baltimore, Md., for Oct. 1, 1935
Washington }
District of Columbia } ss.

Before me, a Notary Public in and for the District of Columbia aforesaid, personally appeared Howard Bandy, who, having been duly sworn according to law, deposes and says that he is the Business Manager of the SCIENCE NEWS LETTER and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, to wit:

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Howard Bandy,
Business Manager

Sworn to and subscribed before me this 12th day of Oct., 1935.

[SEAL]

Charles L. Wade

(My commission expires March 26, 1938)

**Less Than a Worm?**

DINOSAURS were remarkable for their midget brains, no less than for their huge bodies.

The biggest of all of them, the bulky-bellied Diplodocus tribe, huge as houses though they were, had brains that would scarcely equip a present-day rabbit or opossum. Their cranial cavities, as found in their fossilized skulls, have room for about the contents of a bantam hen's egg.

When word came in from Montana not long ago, of the discovery by Dr. Barnum Brown of a fifty-foot dinosaur skeleton representing an animal that must have weighed thirty tons when alive, with a brain cavity that could not have held more than about two ounces of gray matter, one zoologist remarked, "Compared with the size of its body, I do believe that a common fishworm has more of a brain than that!"

It seems to be impossible to find any record of an actual weighing of a fishworm's brain; although the curiosity of zoologists leads them into many strange researches, this particular job presents some particularly baffling difficulties in the technique of dissection, and apparently has never been done. But a casual examination of careful drawings of the internal anatomy of fishworms makes it appear that the low comparative estimate placed on the dinosaur's cerebral equipment might be no less than justice, at that.

Earthworms do have brains. Just above the mouth opening is a pair of tiny round pellets of nervous tissue, fused together. Below the mouth there is another pair, perhaps a trifle smaller, connected with the pair above by a sort of collar of nerve tissue that runs around the worm's gullet. The whole apparatus might properly be called the fishworm's brain, though meticulous zoologists prefer to use the more technical terms, supra-esophageal and sub-esophageal ganglia, respectively.

From the lower pair there runs back through the worm's whole length a pair of slender nerve trunks, on each of which there is a nerve-knot, or ganglion, for every one of the worm's many rings or segments. Thus each joint of the creature has a small private "brain" of its own. It is largely due to these that an earthworm can get along somehow even when it has been cut in two.

Seemingly the dinosaur also had some such arrangement for bodily autonomy. There was, for example, a sort of "second brain" in an enlargement of the spinal column, high up between the huge creature's humped hips. It may very well have taken care of most of the work of walking and the management of the great trailing tail, and perhaps of some of the functions of the internal organs as well. The little brain up in the head of course had charge of seeing and smelling and such hearing as "Dinny" cared to bother about. It also directed the endless job of eating for the jaws. It probably could assemble such vague general concepts as "wet" and "dry," "hot," and "cold." But it is difficult to imagine its doing anything that could be called thinking.

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PUBLIC HEALTH**Hospital System For the United States Proposed**

A HOSPITAL system for the United States, with details as to what classes of patients should be cared for in state and in private hospitals, was presented by Dr. N. W. Faxon, director of the Massachusetts General Hospital, to the American Hospital Association.

Hospitals today are being subjected to the same social and economic forces responsible for the political and social turmoil that has affected a large part of the civilized world, Dr. Faxon pointed out.

A complete state hospital system is not necessary, in his opinion. It is, however, the duty and responsibility of the community to provide hospital care for people unable to provide for themselves.

Public hospitals should care for the indigent and those patients paying less than half the cost of hospital care. In general, they should not admit private patients, when other hospitals are available.

"Private hospitals would care for patients paying more than half the cost of hospital care, for patients paying the full cost of hospital care and private patients paying not only the cost of hospital care, but professional fees as well," Dr. Faxon advises.

"Patients with communicable diseases and psychiatric conditions would form an exception to this rule and it would ordinarily be the responsibility of the community to provide facilities for their care regardless of their economic classification, although they pay according to their ability."

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ANTHROPOLOGY**Most Ancient Africans Had Teeth Without Caries**

DENTAL caries of cavities render doubtful any really great age for several apparently primitive skulls found in Africa during recent years, in the opinion of Prof. T. F. Dreyer of Grey University College, Bloemfontein, South Africa. (*Nature*, Aug. 24)

Prof. Dreyer has examined teeth from between 30 and 35 burials in South Africa, known to date far back into the Old Stone Age, and he has not found a single one of them with caries. On the other hand, teeth from more modern burials at the same site have many such defects.

On the basis of these studies, he comments:

"The indication from this area therefore bears out the experience of European anthropologists—that caries is a comparatively modern disease and that no skull showing this condition can be regarded as ancient. Will anthropologists, in view of these facts, revise their views on certain South African finds—I may be allowed to mention particularly the Broken Hill and the Springbok Flats skulls?"

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Psychology

A HANDBOOK OF SOCIAL PSYCHOLOGY—Carl Murchison, Ed.—*Clark University Press*, 1207 p., \$6. Anyone familiar with the Handbook of Child Psychology will welcome this addition to the International University Series in Psychology. Two dozen recognized authorities cooperate under able editorship to make this a reference volume worthy of a place on the bookshelf of every psychologist and to provide interesting reading to all students of humankind.

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Archaeology

A THIRD-CENTURY PAPYRUS CODEX OF THE EPISTLES OF PAUL—Henry A. Sanders, Ed.—*University of Michigan Press*, 127 p., \$3.00. Prof. Sanders presents the Greek text of 30 leaves of the remarkable Chester Beatty Biblical Papyri, some of the earliest handwritten Bible pages that have come to light. Reasons for a third century dating of the text are outlined, and the significance of the manuscript for Bible textual criticism is discussed.

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Medicine—Physics

APPARATUS AND TECHNIQUE FOR ROENTGENOGRAPHY OF THE CHEST—Charles Weyl and S. Reid Warren, Jr., *Thomas*, 166 p., \$5. Primarily a manual for technicians, this book may also be of profit to diagnosticians and practitioners of thoracic surgery and medicine. Interpretations depend much on a knowledge of the means by which data are obtained.

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History

A HISTORY OF ROME—Cyril E. Robinson—*Crowell*, 456 p., 24 pl., \$3.50. Twelve centuries of national experience, from the rise of a city settlement to the fall of the great Western Empire it came to rule, are covered by this scholarly text. The 19 maps, strategically placed, are a very helpful aid to the student or reader in following the fortunes of ancient Rome.

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Radio

MODERN RADIO SERVICING—Alfred A. Ghirardi—*Radio & Technical Publishing Co.*, 1300 p., \$4. How far radio has progressed since the not-too-distant days when the nation built and serviced its own crystal and one-tube sets is shown by this book. There are, for example, some 2790 models of radio sets

in existence that a radio service man may be called upon to repair. In Mr. Ghirardi's voluminous work the tricks of the trade are clearly presented. But the layman owner of a radio set will do well to call in the "doctor."

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Zoology—Exploration

SNAKE-HUNTER'S HOLIDAY—Raymond L. Ditmars and William Bridges—*Appleton-Century*, 309 p., \$3.50. A veteran snake-man and a good reporter get a vacation—and spend it in the tropics, hunting snakes. Another book that every Ditmars fan (and there are many) will just have to buy.

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Astronomy

THE BINARY STARS—Robert G. Aitken—*McGraw-Hill Book Co.*, 309 p., \$3.75. Second edition of Prof. Aitken's famous work on binary stars, which comprise certainly one-third and possibly two-fifths of all stars observed. The 1918 edition of Prof. Aitken's book contained data on 87 visual binaries and 137 spectroscopic binaries. The present volume, indicative of progress in this important astronomical field, lists 116 visual and 326 spectroscopic pairs. Binary star history, observing methods, calculation of orbits and radial velocity, eclipsing binaries and the origin of binary stars indicate the scope of the book.

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Travel

ROYAL PALACES—Text by A. L. Baldwin—Edited by F. A. Mercer—*Studio Publications*, 99 plates, descriptive text, \$2. Pictures of palaces, inside and out, all the way from Early Tudor to Late Windsor. "British throughout."

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Criminology

ROOTS OF CRIME; PSYCHOANALYTIC STUDIES—Franz Alexander and William Healy—*Knopf*, 310 p., \$3. Reports giving at some length the findings from a psychoanalytic study of eleven typical criminals. Here new light is shed on the mental warpings that result in criminal behavior.

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Zoology

THE REPTILES OF CHINA—Clifford H. Pope—*American Museum of Natural History*, 604 p., \$10. Gradually China is becoming known not only for her immeasurable wealth of history and art but for the equally immeasurable wealth of her natural history, never adequately described in her own classic literature. This volume, tenth in the Central Asian series of the American Museum, will like its predecessors receive an eager welcome from herpetologists and zoologists generally.

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Archaeology

TALES THAT DEAD MEN TELL—J. E. Pearce—*Univ. of Texas*, 118 p., free by applying to Univ. of Texas, Austin, Texas. Under this eye-catching title, Prof. Pearce launches into a pleasantly informal introduction to the science of archaeology. And the University of Texas is thereby started on a new publication series, for this is "Anthropological Paper, volume 1, number 1." Prof. Pearce has addressed himself to the "intelligent lay reader" rather than the professional scientist in this plea for wider use of the archaeologists' discoveries in studies of civilization.

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Astronomy

THE HOME-MADE TELESCOPE—Wilbur F. Decker—*Perine Book Co., Minneapolis*, 46 p., 50c. A concise, illustrated description of the making and mounting of small reflecting telescopes.

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Ethnobotany

ETHNOBIOLOGICAL STUDIES IN THE AMERICAN SOUTHWEST; I. UNCULTIVATED NATIVE PLANTS USED AS SOURCES OF FOOD—Edward F. Castetter—*Univ. of New Mexico Press*, 61 p., 25c. The initial study in a series which promises to be of much value to both ethnologists and students of the life sciences.

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Physics

RAYONS COSMIQUES—B. Rossi—*Hermann & Cie, Paris*, 48 p., 12 francs.

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